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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/811,597	03/29/2004	Ravi Prasher	P18285	2876
28062	7590	10/17/2006	EXAMINER	
BUCKLEY, MASCHOFF, TALWALKAR LLC			NGUYEN, HUNG THANH	
5 ELM STREET			ART UNIT	PAPER NUMBER
NEW CANAAN, CT 06840			2841	

DATE MAILED: 10/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/811,597

Applicant(s)

PRASHER, RAVI

Examiner

HUNG T. NGUYEN

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 June 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 and 23-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16, 23-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

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**DETAILED ACTION*****Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3, 6-11, 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Messina et al. (US 5,239,200) in view of Vogel et al. (US 6,317,326).

Regarding claim 1: Messina et al. discloses in figures 1 and 6, an apparatus comprising: an integrated circuit die (16) having a front surface (bottom portion of 16, facing to element 12) on which an integrated circuit is formed and a rear surface (top portion of 16, facing element 100) that is opposite to the front surface (bottom portion of 16, facing to element 12); a member (combination of 20, 40 and 100) to define at least one microchannel (gap between 22 and 46) at the rear surface (top portion of 16, facing element 100) of the die (16), the microchannel (gap between 22 and 46) to allow a coolant to flow therethrough (see column 3, lines 28-41). Messina et al. does not disclose at least one thin film thermoelectric cooling device in the at least one microchannel.

Vogel et al. discloses in figure 1, at least one thin film thermoelectric cooling device (114) in the at least one microchannel.

Messina and Vogel et al. are analogous art because they are from the same field of endeavor to make cooling system.

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Therefore, it would have been obvious for one ordinary skill in the art at the time of the invention to make cooling of Messina et al. to have thin film thermoelectric device as taught by Vogel et al. for be benefit of reducing heat.

Regarding claim 2: Messina et al. discloses all elements of the apparatus as described above with respect to claim 1 except, Messina does not disclose at least one thermoelectric device is formed on the rear surface of the IC die.

Vogel et al. discloses in figure 1, at least one thermoelectric device (114) is formed on the rear surface of the IC die (explain above).

Messina and Vogel et al. are analogous art because they are from the same field of endeavor to make cooling system.

Therefore, it would have been obvious for one ordinary skill in the art at the time of the invention to make cooling of Messina et al. to have thin film thermoelectric device as taught by Vogel et al. for be benefit of reducing heat.

Regarding claim 3: Messina et al. discloses in figures 1 and 6, the member (explain above) has a front side (bottom portion of combination 20, 100, facing rear surface of 16) which faces the rear surface of the IC die (explain above), said front side (bottom portion of combination 20, 100, facing rear surface of 16) of the member (explain above) having at least one groove (28) therein to define the at least one microchannel (explain above).

Regarding claim 6, 7, 10: Messina et al. discloses in figure 6, the member is formed of copper (see column 3, lines 24-30).

Regarding claim 8, 9: Messina et al. discloses in figure 6, the coolant includes water (see column 3, lines 28-41).

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Regarding claim 11: Messina et al. discloses in figure 6, the member (explain above) is bonded (It appears member is bonded to IC) to the rear surface of the IC die (explain above).

Regarding claim 15: Messina et al discloses all elements of the integrated circuit as described above with respect to claim 1 except, Messina et al. does not disclose the integrated circuit formed on the front surface of the IC die is a microprocessor.

However, it is old and well known for one ordinary skill in the art to make integrated circuit on the surface of the IC is a microprocessor for the purpose of processing data.

Therefore, it would have been obvious for one of ordinary skill in the art at the time of the invention to make integrated circuit on surface of IC is a microprocessor for the benefit of processing data.

Claims 4-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Messina et al. (US 5,239,200) in view of Vogel et al. (US 6,317,326) and Bhatia (US 6,094,919).

Regarding claim 4: Messina et al. discloses all elements of an apparatus as described above with respect to claim 1 except, Messina et al. does not disclose the member is an integrated heat spreader.

Bhatia discloses in figure 1, the member is an integrated heat spreader (11).

Messina et al. and Bhatia are analogous art because they are from the same field of endeavor to make cooling system.

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Therefore, it would have been obvious for one ordinary skill in the art at the time of the invention to make cooling of Messina et al. to have heat spreader as taught by Bhatia for be benefit of reducing heat.

Regarding claim 5: Messina et al. discloses in figure 6, the member is formed of copper (see column 3, lines 24-30).

Claims 12, 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Messina et al. (US 5,239,200) in view of Vogel et al. (US 6,317,326) and further in view of Prasher et al. (US 6,934,154) and Venkatasubramanian (US 6,722,140).

Regarding claim 12, 14: Messina et al. discloses all elements as described above with respect to claim 11 except, Messina et al. does not disclose a heat spreader; the member interposed between the heat spreader and the rear surface of the IC die; the at least one microchannel including: a first tier of microchannels defined by the rear surface of the IC die and by grooves in the member; and a second tier of microchannels defined by a rear surface of the member and grooves in the heat spreader, the second tier of microchnnnels being above the first tier of microchannels.

Prasher et al. discloses in figures 1-4c, a heat spreader (104); the member (308) interposed between the heat spreader (104) and the rear surface of the IC die (100); the at least one microchannel including: a first tier of microchannels (first channel from left of 308) defined by the rear surface of the IC die (100) and by grooves (306) in the member (308).

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Venkatasubramanian discloses in figure 1, a second tier (second tier 7 from first tier 8) of microchannels defined by a rear surface of the member the second tier (second tier 7 from first tier 8) of microchnnnels being above the first tier of microchannels (element 7 above element 8).

Messina et al. and Prasher et al. and Venkatasubramanian are analogous art because they are from the same field of endeavor to make cooling system.

Therefore, it would have been obvious for one ordiarny skill in the art at the time of the invention to make cooling system of Messina et al. to have first/second tier for the benefit of reducing heat.

Regarding claim 13: Messina et al. discloses all elements of the apparatus as described above with respect to claim 1 except, Messina does not disclose at least one thermoelectric device is formed on the rear surface of the IC die.

Vogel et al. discloses in figure 1, at least one thermoelectric device (114) is formed on the rear surface of the IC die (explain above).

Messina and Vogel et al. are analogous art because they are from the same field of endeavor to make cooling system.

Therefore, it would have been obvious for one ordinary skill in the art at the time of the invention to make cooling of Messina et al. to have thin film thermoelectric device as taught by Vogel et al. for be benefit of reducing heat.

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Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Messina et al. (US 5,239,200) in view of Vogel et al. as applied to claim 1 above and further in view of Venkatasubramanian (US 6,722,140).

Regarding claim 16: Messina et al discloses all elements of the integrated circuit as described above with respect to claim 1 except, Messina et al. does not disclose at least one thermoelectric device includes at least one pair of stacked thermoelectric devices.

Vankatasubramanian discloses in figure 1, at least one thermoelectric device includes at least one pair of stacked thermoelectric devices (elements 3-8 are stack of TFTEC devices).

Messina and Vankatasubramanian are analogous art because they are from the same field of endeavor to make cooling system.

Therefore, it would have been obvious for one ordinary skill in the art at the time of the invention to make cooling system of Messina et al. to have stack of thermoelectric device as taught by Vankatasubramanian for be benefit of reducing heat.

Claims 23- 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Messina et al. (US 5,239,200) in view of Vogel et al. (US 6,317,326).

Regarding claim 23: Messina et al. discloses in figures 1 and 6, an apparatus comprising: an integrated circuit die (16) having a front surface (bottom portion of 16, facing to element 12) on which an integrated circuit is formed and a rear surface (top portion of 16, facing element 100) that is opposite to the front

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surface (bottom portion of 16, facing to element 12); a member (combination of 20, 40 and 100) to define at least one microchannel (gap between 22 and 46) at the rear surface (top portion of 16, facing element 100) of the die (16), the microchannel (gap between 22 and 46) to allow a coolant to flow therethrough (see column 3, lines 28-41), a chip (16) set in communication with the microprocessor.. Messina et al. does not disclose at least one thin film thermoelectric cooling device in the at least one microchannel.

Vogel et al. discloses in figure 1, at least one thin film thermoelectric cooling device (114) in the at least one microchannel.

Messina and Vogel et al. are analogous art because they are from the same field of endeavor to make cooling system.

Therefore, it would have been obvious for one ordinary skill in the art at the time of the invention to make cooling of Messina et al. to have thin film thermoelectric device as taught by Vogel et al. for be benefit of reducing heat.

Regarding claim 24: Messina et al. discloses all elements of the apparatus as described above with respect to claim 1 except, Messina does not disclose at least one thermoelectric device is formed on the rear surface of the IC die.

Vogel et al. discloses in figure 1, at least one thermoelectric device (114) is formed on the rear surface of the IC die (explain above).

Messina and Vogel et al. are analogous art because they are from the same field of endeavor to make cooling system.

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Therefore, it would have been obvious for one ordinary skill in the art at the time of the invention to make cooling of Messina et al. to have thin film thermoelectric device as taught by Vogel et al. for be benefit of reducing heat.

Regarding claim 25: Messina et al. discloses in figures 1 and 6, the member (explain above) has a front side (bottom portion of combination 20, 100, facing rear surface of 16) which faces the rear surface of the IC die (explain above), said front side (bottom portion of combination 20, 100, facing rear surface of 16) of the member (explain above) having at least one groove (28) therein to define the at least one microchannel (explain above).

Regarding claim 26: Messina et al. discloses in figure 6, the member is formed of copper (see column 3, lines 24-30).

Claims 27-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Messina et al. (US 5,239,200) in view of Vogel et al. (US 6,317,326) and Vankatasubramanian (US 6,722,140).

Regarding claim 27-28: Messina et al. discloses discloses all elements of the integrated circuit as described above with respect to claim 1 except, Messina et al. does not disclose a drive circuit to supply electrical power to the at least on thermoelectric device.

Vankatasubramanian discloses in figure 1, a drive circuit to supply electrical power to the at least on thermoelectric device.

Messina and Vankatasubramanian are analogous art because they are from the same field of endeavor to make cooling system.

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Therefore, it would have been obvious for one ordinary skill in the art at the time of the invention to make cooling system of Messina et al. to have drive circuit as taught by Venkatasubramanian for be benefit of supply electrical power to thermoelectric.

Relevant Art

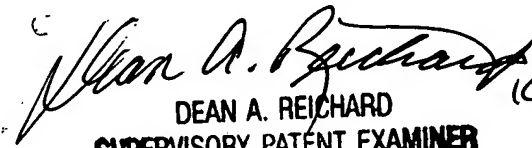
The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The Hiraishi (US 6,314,741) teaches the cooling system, Johnson et al. (US 6,278,049) teaches the thermoelectric device, Chu et al. (US 2002/0062855) teaches the cooling assembly for electronic, Chu et al. (US 6,804,966) teaches the heat dissipation, Law et al. (US 6,711,904) teaches the heat management, Xie (US 5,880,524) teaches the heat pipe for electronic, Clark (US 4,930,280) teaches the liquid cooling system, Cardella (US 5,918,469) teaches the cooling electronic device, Chu et al. (US 6,424,533) teaches thermoelectric with heat spreader.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HUNG T. NGUYEN whose telephone number is 571-272-5983. The examiner can normally be reached on 8:00AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, KAMMIE CUNEO can be reached on 571-272-1957. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

HN


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SUPERVISORY PATENT EXAMINER
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10/15/06

HUNG THANH NGUYEN

10/3/2006